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AND
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A Magazine of Popular Science for the Lecture-room and the Domestic Circle.
Edited by J. HAY TAYLOR.
[Entered at Stationers' Hall.]

Vol. 7.—No. 85. JUNE, 1896. Price 1d., Post free 2d.

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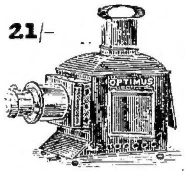

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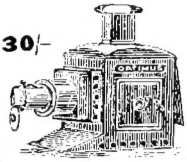

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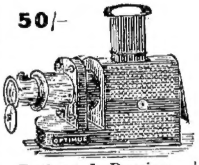

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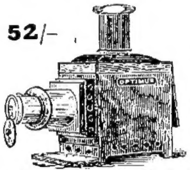

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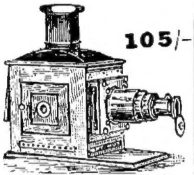

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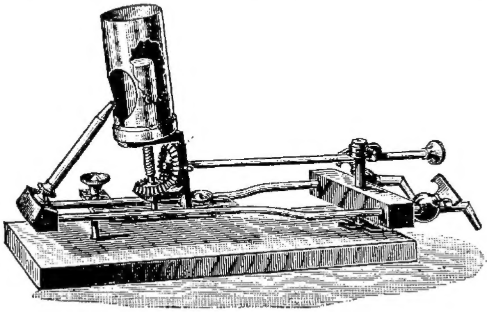

Read the following report (Optical Magic Lantern Journal, November, 1894) on the Candle-power of various Jets, by Mr. W. J. Coles, A.M.I.C.E.:—

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THE OPTICAL

MAGIC LANTERN

JOURNAL

AND

PHOTOGRAPHIC ENLARGER.

EDITED BY J. HAY TAYLOR.

Vol. 7.—No. 85. [Entered at Stationers' Hall] JUNE, 1896. Price 1d., Post-free 2d.

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Notices.

THE *Optical Magic Lantern Journal and Photographic Enlarger* is issued on the 1st of every month, price One Penny, and may be obtained from all Newsvendors, Railway News Stalls, Photographic Dealers, or from the Publishers, at the following rates, post free:—

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SMALL ADVERTISEMENTS must reach the office not later than the first post on the 24th of each month. All cheques and postal orders to be made payable to the Magic Lantern Journal Company, Limited.

EDITORIAL communications must be addressed, J. HAY TAYLOR. Advertisements and business communications to the **Magic Lantern Journal Company, Limited, 9, Carthusian Street, London, E.C.**

American Agents:—The International News Co., 83 and 85, Duane Street, New York City.

Important Notice!!!

WE have much pleasure in informing our numerous readers that we have removed to our new offices at

9, CARTHUSIAN STREET, E.C.

(Close to Aldersgate Street Station).

All **EDITORIAL** communications should be addressed—

J. HAY TAYLOR,
"Optical Magic Lantern Journal,"
9, CARTHUSIAN STREET,
LONDON, E.C.

All **BUSINESS** communications, advertisements, etc., should be addressed—

The Secretary,
Magic Lantern Journal Co., Ltd.,
9, CARTHUSIAN STREET,
LONDON, E.C.

Our Forthcoming Annual.

I HAVE now in course of progress an Annual and Almanac, which will pertain to such subjects as have been dealt with in this journal during the past eight years. During these years I have received great numbers of letters from every part of the world, speaking in high terms of this journal, and of the impetus that it has been the means of giving to lantern work both for amusement and instruction.

The publication of the contemplated annual (which will be issued every August) is the outcome of suggestions received from the numerous readers, many of whom have kindly offered assistance in the form of short practical articles. It will thus be seen that it will contain the expression of a diversity of thought.

At the present time many of those articles have reached me, and are in type, and I would ask those who intend to kindly lend me their support to let me have their communications during the next four or five weeks. As illustrations greatly facilitate reading, a rough sketch with articles will be ample from which to make finished drawings and blocks.

Those who wish advertisements displayed in the annual will of course communicate with our publishers.

J. Hay Taylor, Editor.

——:o:——

Notes.

Messrs. Domeier & Co. are now supplying tungstate of lime in crystals, for experiments with the Röntgen rays, at a moderate price.

* * *

The Hackney Photographic Society has issued a creditable balance-sheet, and quite lately a 12 inch by 10 inch camera has been purchased for the use of the members. Under the able hon. secretaryship of Mr. Fenton Jones this society has raised itself to a very high standard, and it is to be regretted that owing to pressure of business Mr. Jones feels constrained not to seek re-election.

* * *

Messrs. E. H. Kloot & Co., makers of scientific instruments, have lately dissolved partnership, and Mr. Kloot has established himself on his own account at 4, Tenter Street North, Aldgate, E.

* * *

Diamonds when submitted to the X rays allow the rays to pass through them, whilst to these rays imitation ones are opaque.

* * *

A pleasing combination of music and lantern exhibitions was lately given by the Rev. James Hay at Montrose, which tended to keep the members of the Mission Hall in harmonious contact.

* * *

Rumour is ever busy, and it now says that Mr. Walter Tyler, of Waterloo Road, has purchased the oxygen works at Sheffield Street, erected by Leonard Chapman & Co. We do not know definite particulars, but it is certain that Mr. Tyler has some startling announcement to make to lanternists—at least, his advertisement on our front page intimates as much.

There would appear to be a good opening for ladies to undertake lantern entertainments. A series of successful entertainments by Mrs. Ellis and Miss Sturge have lately been given in the Midlands. One lady gave the lectures, and the other manipulated the lantern.

* * *

In the course of a lecture on acetylene by Mr. J. M. Crafts at Boston, United States, America, he explained that "the peculiar property of acetylene which gives it strength is its storing up of heat. I consider it very desirable that a great deal more work and study be put into acetylene than have been. Its use for gas engines is worth looking into. I hope the companies dealing in it will see their way clear for larger experiments. I would like to see a railroad train from headlight to rear lanterns lit with acetylene and given a thorough trial. A small village should be equipped with the cylinders. Only in this way can an old industry which has been built up by years of thought and labour be supplanted."

* * *

On the authority of Professor W. J. Spratley, it is said that the Röntgen X rays are the astral light of Mrs. Besant and Madame Blavatsky, and appear worthy of attention. "Personally (he says), I am strenuously opposed to the distorted cult of theosophy, yet its votaries may be the jailers of many great truths. And it is obvious that if light and thought are one, and if the X rays are, in their ultimate characteristic, a form of thought, the claim of a certain Parsee may have some foundation, in fact, for clairvoyance, and all astral phenomena are modes of thought, and occult, or astral, light is contained in thought; therefore, as light is a connecting link between thought and matter, 'Röntgen's Shadow Forms' may be the window of the invisible."

* * *

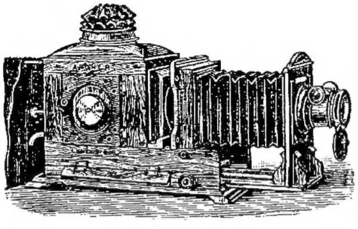
When recently lecturing at the Royal Institution on acetylene gas, Professor Dewar showed an interesting experiment. Into a glass vessel filled with acetylene he introduced an electric arc, and by means of the lantern projected the results on the screen. It was seen that as the sparks passed through the gas, particles of carbon floated in the globe containing the gas, until they formed a connection between the poles, and a spark was no longer visible, the current being carried across.

* * *

Harper Bros., of New York, have entered an action against Messrs. Riley Bros., of Bradford

ARCHER'S IMPROVED OPTICAL LANTERNS.

Two Prize Medals.



Will show to perfection any distance from the screen.

Proved superior to all others, See Reports. **"THE IDEAL"** our new PERFECT Single Lantern and Automatic Dissolver

See Enthusiastic Testimonials from Paul Lange, Esq., G. E. Thompson, Esq., **Manchester Camera Club**, *and many others*.

"THE IDEAL," the Lantern of the future. Price £8 15s. complete.

No. 3, Plainer Form, £6 6s. complete.

The Improved "PHOTINUS" is the most powerful oil lantern in the world. Price **£4 4s.**

ARCHER'S NEW OPAQUE SCREENS, just supplied to the Manchester Photo Society, as they proved, THE BEST OF ALL. (See Testimonial.)

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GENERAL WANTS, &c.

First twenty words, 6d.; every three extra words, 1d. Trade Advertisements in this column, 3s. per ½-inch.

A PRACTICAL Lanternist of 20 years' experience is open to engagements, with or without his own apparatus, in town or country, on very moderate terms. Reference, Editor of this Journal.—Address, Optics, 13, York-street, Walworth, London, S.E.

WANTED Stereoscopic ½-plate Camera, good R.R. Lenses. Approval; deposit.—Robert T. Brain, 4, Euston Road, Great Yarmouth,

MASON'S S.W. Rectilinear Lenses; quality guaranteed; approval if desired; 5 by 4, 15s.; ½-plate, 21s. Repairs, etc.—R. G. Mason (from J. Swift), 69, Park-road, Clapham, S.W.

JET.—Kirshaw's Patent Self-centering Blow-through; used twice; sell 15s.; perfect. Also Scott's Patent Saturator; complete; little used; sell £1.—Blaker, Studio, Worthing.

MAGNIFICENT Coloured Slides.—40 India, 15s.; 60 Canada, 25s.; 20 Uncle Tom's Cabin, 9s.; 24 Life of Christ, 10s.; some Temperance and Comic Sets. 4-wick Oil Lamp, 7s.; 3-wick ditto, 7s.; Reading Lamp, 2s.; some Mechanical Slides half-price.—Prof., 122, Grey Rock-street, Everton, Liverpool.

IF you intend getting up any lantern slides or lecture sets, sacred, moral, temperance, secular, scientific, or comic, and require drawings from which to produce your slides, Weeks is the artist par excellence to execute your orders; accurately and artistically illustrating all subjects.—Frank F. T. Weeks, Artist-Draughtsman to the trade (established 1875), The "Park" Photique-art Studio, 263, Cann Hall-road, Leytonstone, E.

MUSICAL Instruments exchanged for good lantern outfit or long focus camera for copying, etc.; good make with R. R. lens; Busson's £5 5s. organ accordion, 1 stop, 2 sets reeds, 3 octaves, in lock-up box; three 13 key clarionets, A (ebony) and B♭ (boxwood), in mahogany case; E♭ (boxwood); powerful orchestral violin (Strad. copy), cost £7 7s.—Mr. Schutz, 21, Ann-street, Worthing.

COLOURED Slides.—40 Tour in Western Norway, 30s.; also 50 Mr. Gladstone's Home, 40s., with lectures.—Clent Cottage, Harborne, Birmingham.

A NUMBER of second-hand mixed jets required at once; must be of an approved make, and in first-class condition.—Particulars and cash price to W. L. Reed, Optical Lantern Outfitter, 7, Westmoreland-road, Newcastle-on-Tyne.

OXYGEN Gas Holder.—Automatic water pressure; no weights; perfectly safe; easy to use; been in use for month at a recent exhibition, otherwise new; will sell cheap to immediate purchaser, and pay carriage. —Blaker, Studio, Worthing.

RUSSIAN Iron Lantern, only £2; brass open stage, Stocks' lamp, 4 in. condensers; also temperance, effect, and other slides, cheap; 12 ft. screen frame in case. — For particulars apply, Bray, Lanternist, 17, Thorpe-road, Forest Gate, E.

SLIDE-MAKING.—A practical young man requires engagement; 12 years' experience (wet plate), well up in all branches, colouring, etc.; low wages for permanency, highest testimonials.—T., c/o Rogers, 45, Hencraft, Slough, Bucks.

CALCIUM Carbide, best quality, packed in air-tight tins; 7 lbs. 4s. 8d.; 14 lbs. 8s. 2d.; 28 lbs. 14s.—Thorn & Co., makers of the "Incanto" Acetylene Gas Generators, etc., 169, Camberwell New-road, London, S.E.

RAINBOW Advertising Lamp.—Simple, attractive, brilliant; automatically changes colour; no clockwork; almost new; write particulars, enclosing ½d. stamp; good chance for cheap advertising medium.—Blaker's Studio, Worthing.

YOUNG Lady (experienced) wanted for Counter and Detail Work of Slide-hiring business; abstainer. —Write, stating qualifications and salary required, to Manager, 60, Old Bailey, E.C.

FOR Sale, a Splendid Set of Lantern Slides, entitled "From Liverpool to Rocky Mountains" (60 slides); well coloured; will sacrifice for quarter cost., viz., 30s. —W. Hudson, Frederick-street, Widnes.

100,000 FOREIGN Stamps.—Collector, having resolved to dispose of the above, irrespective of catalogue price, will sell same in lots of 1,000 at £2 2s., including postage and registration; no fiscals; guaranteed different; sent in rotation as orders received; no post cards; reference editor Lantern Journal.—Philatelist, 16, Ann-street, Worthing.

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It is absolutely AUTOMATIC, giving the Lanternist enough Gas AT AN UNVARYING pressure for a Lecture of two hours' duration.

It can then be re-charged in a moment, the Light still burning at the Lantern.

An ILLUSTRATED PAMPHLET, giving full particulars of the LATEST IMPROVED APPARATUS, will be published shortly, and will be forwarded to all the numerous applicants and others requiring particulars.

F. J. STEDMAN, 147, Strand, W.C.

N.B.—Mr. STEDMAN will be pleased to show and explain the working of the Apparatus by appointment.

and New York, which certainly puts the American copyright law in a very unfavourable light. When the popular story "Ben Hur" was printed by Harpers, they reserved all rights to the publication and dramatisation of the novel, and afterwards sold the dramatisation rights to Messrs. Clarke & Coxe, a Western firm. Messrs. Riley, at considerable expense, have prepared an illustrated lantern lecture on the story, and Messrs. Clarke & Coxe now object to this as an infringement of their rights of dramatisation, and claim damages to the tune of 10,000 dollars.

* * *

In this country it might seem absurd to claim that a lantern entertainment is in effect a dramatic representation. The action is a novel one, and is regarded as a test, and on the 20th ulto. Mr. Riley, sen., left Bradford for New York to defend the case.

* * *

Mr. A. H. Saunders, of Birmingham, has a supply of X rays slides in stock taken from negatives by Dr. Hall Edwards.

* * *

Messrs. Wrench & Son have acquired the patents rights of Mr. Friese Green, in connection with all the apparatus invented by him for making and producing so-called animated photographs on the screen. The apparatus is exceedingly simple in make, and will probably soon be put upon the market to sell for a few pounds.

* * *

In our last issue we stated that Dr. John Nicol had assumed the editorial management of the *Photo American*. We should have said the *American Amateur Photographer* instead, and haste to correct the error.

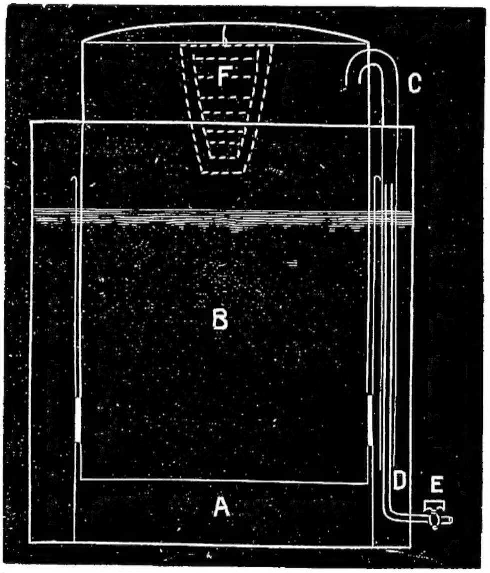
——:o:——

Acetylene Gas for the Lantern.
No. II.

The general principle of a generator for acetylene gas, as mentioned in an article in last issue, is to all intents and purposes one of the most simple and easiest methods of generating this gas in small quantities. Since the publication of our May number, we have received one of the generators manufactured by the Acetylene Gas Company, of Ashford, Kent. It is composed of two tanks, one to hold the water, and the other the gas, the latter being, of course, inverted in the former. (A) represents the portion into which is poured water, up to about the line shown in cut, the bell portion or gas holder proper being represented as (B). On a hook in the upper part of this is suspended the necessary basket or holder, which contains the requisite supply of calcium carbide.

This basket (F) is made throughout of perforated zinc, which enables the water to drip away from the calcium as soon as the basket is raised out of it, by reason of some gas having been evolved. Having the basket made throughout with perforations, we consider an improvement on those which have a closed bottom and a series of perforations in the upper part only. From the bottom of the tank (A) are upright rods, on which the bell (B) slides up and down, and which ensures this being kept perfectly upright.

Most of our readers will, of course, understand the principle applied to gasaliers in houses, whereby they can be drawn down for a foot or so, there being a water-trap to prevent escape of gas. This principle is applied to the outlet pipe of this generator. The tap (E) having been turned on, the gas passes through the tube (C), which tube it will be noticed slides on the outside of another, which terminated at the tap (E), and as the upper pipe is continually immersed under the surface of the water, escape of gas is thus rendered impossible, while no resistance is offered to the rising and falling of (B).



The makers claim that this generator will continue to work without attention for eight hours. The basket is capable of holding about two pounds of calcium carbide, but when trying it we only put in a charge of one pound (carefully weighed), and after connecting (via E) a Bray's burner of 0000 capacity, found that the light lasted exactly three hours and five minutes. For lantern work two burners, placed about half an inch apart, are preferable to one only, and this would give, at the rate of one pound of calcium carbide, and two 0000 burners one hour and a half, or with the basket charged with two pounds, three hours.

We find the same fault with this apparatus that we did with the first model of another make of generator that was sent to us, viz., that no means are provided for keeping the condensed moisture from the gas out of the supply pipe. This, as we suggested in our former article, can be easily overcome, and doubtless the Acetylene Gas Company will see the necessity for coping with this drawback.

At (c) it will be observed that the tubing takes a turn or bend inside of the gasometer; this is a simple, although very important, addition to a gasometer of this character. When burning acetylene gas, if the pressure be taken off to a great extent, not only does the gas flame become lowered, but as soon as it becomes lowered it at once begins to give off a dense smoke, which will in a few minutes descend in a perfect "rain," which will settle on everything in a room, much to the discomfort of those who have to attend to the dusting of same. But by means of this little trap or bend (c) all this annoyance is prevented, for if the supply of gas has become practically exhausted, and the gas holder is descending for the last time, just before the pressure is diminished the lower end of this bend dips into the water, at once shutting off this outlet to the gas. The measurements of this generator are 13 by 17 inches.

——:o:——

Investigation Concerning Acetylene Gas.

In order to put before the public a report on this subject, *The Progressive Age* of New York have, at great cost, obtained the services of Edwin J. Houston, Ph.D.A.E., Kenelly, Sc.D., A.I.E.E., and Dr. L. P. Kinnicutt, D.Sc., as commissioners to investigate this subject. Although this report is protected by copyright in this as well as other countries, we are indebted to the proprietors of *The Progressive Age* for permission to publish an extract.

The report goes on to state that the first announcement respecting calcium carbide was made by Sir Humphrey Davy, that carbon and potassium when heated to a temperature sufficiently high to vaporise the potassium, formed a compound, which after cooling would effervesce with water.

Berzelius announced in 1836 that the black substance formed in small quantities as a bye-product in producing potassium from potassic carbonate and carbon was carbide of potassium.

Wohler made carbide of calcium in 1862 by fusing an alloy of zinc and calcium with carbon. He ascertained that it decomposed in contact with water forming calcic hydrate and acetylene.

Berthelot in 1866 described sodium carbide or acetylene sodium. He discovered that the high temperature of the electric arc within an atmosphere of hydrogen would unite with carbon of the charcoal terminals and form acetylene gas.

Carbide has generally been styled "a dark gray substance." A good quality gives five cubic feet of gas to the pound, and has a reddish tinge. Carbide of inferior quality may be grayish or intensely black in colour.

The synthetical possibilities include acetylene, marsh gas, alcohol, oxalic acid, acetic acid, cyanhydric acid, benzene, ethylene, etc.

Acetylene as a means of procuring power is dwelt on, and the following comparisons made with respect to coal:—

(1) Coal.—The 600,000 horse-power hours will need, at 1,543 lbs. per horse-power hour, 413 tons of coal, occupying, when well stowed, a space of 14,800 to 15,200 cubic feet.

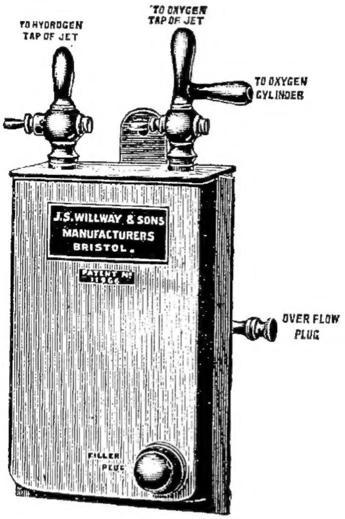
(2) Liquid acetylene.—According to Ihering and Slaby's figures, 0·4 lb. nearly is required per horse-power with large engines, or 106 tons for 600,000 horse-power hours. A specific gravity of ·451 at 0 deg. C. corresponds to ·364 at 35·8 deg. C. (about the temperature of the ship's hold); and therefore 106 tons would require vessels of 9,500 to 10,600 cubic feet capacity, and these to be absolutely safe at a pressure of upwards of 50 atmospheres.

(3) Calcium carbide.—The corresponding amount of 90 per cent. carbide would be 295 tons, which, at a specific gravity of 2·22, would occupy a space of 4,625 cubic feet, or, allowing for the tins in which the blocks are stored, about 5,300 cubic feet.

Therefore, to supply power for 25 days to a 1,000 horse-power engine requires:—Good coal 413 tons, having a volume of 14,800 cubic feet; compressed acetylene 106 tons, having a volume of 9,890 cubic feet; or calcium carbide 295 tons, having a volume of 4,770 cubic feet.

Another point in favour of the use of calcium carbide as motive power is that coal needs a

THE PENDANT SATURATOR.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TO OXYGEN TAP OF JET
TO OXYGEN CYLINDER
J.S. WILLWAY & SONS MANUFACTURERS BRISTOL.
PATENT No
OVER FLOW PLUG
FILLER PLUG

ABSOLUTE SAFETY.

Capacity equal to 20 cubic feet of Hydrogen.

No trouble from fluid in tubes.

Perfect steadiness. No readjustment of tap required after starting. Great brilliancy.

Price 35s.

Revolution in Jets!!!

1,500 CANDLE-POWER.

Gwyer's Patent Jet

Was FIRST in the recent LIMELIGHT CONTEST On the 22nd of JANUARY.

Is equally efficient for Mixed Gases and Ether.

Write for Particulars to the Manufacturers—

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DRAWBRIDGE, BRISTOL.

THORNTON-PICKARD CAMERA "RUBY" PATTERN.

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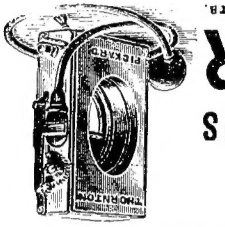

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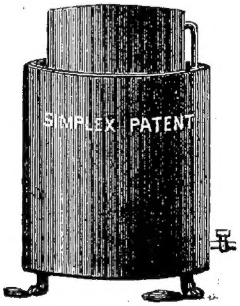

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boiler which is expensive both in first cost and maintenance, and liquid acetylene requires large storage vessels, whereas simple apparatus only is needed with the carbide.

The calorific value of acetylene is, according to Julius Thomsen, 11,923; the molecular weight 64·40 parts Ca, 24 parts C.; specific gravity when compared with air, 0·91; density at 32 deg., and 30 inches bar. pr. 0·073 lb. per cubic foot; water at 60 deg. F. at atmospheric pressure dissolves about one volume of acetylene.

In America carbide of calcium is manufactured at Spray, N.C., by the Willson Aluminium Company; at Niagara Falls, by the Carbide Company; and at the works of the Electric Smelting and Aluminium Company, Lockport, N.Y.; and in Europe, by the Electro-Chemische Works at Betterfield, Prussia; at Neuhausen, by the Aluminium Industrie Actien Gesellschaft; in Germany, at the Mannheim Works at Baden; in France by the Elektro-Metallurgical Works at Froges and Vallorbes.

The exact cost of the spray plant chargeable to the production of carbide is almost impossible to determine accurately, since much of the plant has been installed for purely experimental purposes. The following estimates, however, are based on actual costs:—

Land	$ 100
Building	1,250
Turbine	2,892
Electric plant	6,000
Counter shafting	200
Crusher and mill	1,025
Rolls	238
Furnaces	150
Equipment, tools, etc.	100
	$11,955

Labour: Superintendent at $4 per day	$4·00
Labour: Three squads of men, eight hours each	7·00
	$11·00

Output of gross carbide in one day of 24 hours	2,000 lb.
Materials, carbon for upper electrodes at 6 cents per lb. ...	$ 0·86
Coke from Pocohontas Mines, Va., $1·50 per ton f.o.b. Cost delivered, $4·55 per ton. Daily consumption, 2,000 lb. × 1·125 = 2,250 lb.	5·119
Lime from Carson Lime Company, of Riverton, Va., about $1·75 per ton f.o.b., average cost delivered $6·30 per ton	8·411
	$14·390

Materials per day and per ton of gross carbide...	$14·39
Labour, per day and per ton of gross carbide	11·00
Water-power, 1,299 5·365 ...	3·37
Petty stores, waste, etc., $150 per annum...	0·41
Taxes, at $100 per annum ...	0·274
Interest on investment at 5 per cent., $11·955	1·638
Depreciation and repairs, 5 per cent. on electric plant and turbine	1·218
6 per cent. on countershafting, building, rolls and crusher	·446
20 per cent. on furnaces	·021
	$32·767

The estimate, therefore, of the cost of producing calcium carbide at Spray, by working the furnaces 365 days a year, and 24 hours a day, yielding on an average 1 ton of 2,000-lb. gross carbide a day is 32,767 per ton. Of this amount, $14·39 is for material. The freight charges on lime and coke are heavy at Spray, and add materially to the cost.

The net carbide in the tests gave an average yield of 4·926 cubic feet of moist acetylene gas per pound, making an average yield of 4·696 cubic feet of moist acetylene per pound of gross carbide. Pure calcium carbide should yield theoretically approximately 6 cubic feet of gas per pound, when saturated with aqueous vapour at 60 deg. F., so that the net carbide averaged only 82·1 per cent., and the gross carbide only 78·26 per cent. of the theoretical yield. The acetylene yielded, however, was practically pure.

:o:

Acetylene Gas in Italy.

By W. Miles Barnes (Florence).

I have been rambling over the continent for some months past, and the last number of the Magic Lantern Journal which reached me is dated January, consequently I do not know what progress has been made in England since that time in perfecting the apparatus for lighting by acetylene gas. If no progress has been made, the Italians are before us, for apparatus for the purpose (Sistema Frosali) may now be bought both in Rome and here in Florence.

Five pounds is the retail price for a gasometer, with all things necessary for the manufacture of gas for the supply of fifty jets, and the operation is simplicity itself. A little water is poured into the gasometer, the charge of carbide dropped into the container, and the cover fastened down; the gas comes off freely, and its supply is regulated automatically. The carbide costs 80 centisimi a kilo (rather less than 4d. a pound), and half a pound (2d. worth) will supply one jet for 4½ hours. As to the quality of the light, it is intense, pure, steady and white, not unlike the electric light. Four jets of it in a shop in the Piazza Signora rivals in brilliancy the arc light which hangs outside not far distant; at any rate the gas seems destined to compete with the limelight for the lantern.

The proprietor of the shop assures me it is perfectly safe, and the fact that the apparatus stands at work in his shop, which is often full of people, proves his own faith in it, and there is not the slightest odour from it when burning

——:o:——

The Retort Courteous.

A FEW years ago, during the progress of an old-fashioned stereopticon entertainment, in a town not far from Philadelphia, an incident occurred which not only gave the lecturer a good opportunity to make a clever retort, but also to rebuke a would-be funny fellow, who, during most of the evening, had proved himself an unmitigated nuisance. The audience had several times manifested impatience at the annoying interferences, but to no effect. Toward the close of the exhibition, says the *Exhibitor*, the speaker began a description of the pictures which make up the dissolving effect known as "The Old Mill." The view upon the canvas showed an old country mill, in midsummer, with the water-wheel in motion, and a swan gracefully swimming across the lake. The lecturer began asking questions, which the bird would answer by motions of the head. To one of these queries the funny fellow made reply, when the lecturer suddenly turned upon him and said, "I beg your pardon, sir; it was the goose on the canvas I was speaking to, not the one in the gallery." The audience spontaneously broke into a storm of applause, and the discomfited interrupter soon after took his departure, along with several of his comrades. As they started for the door one of them remarked, loud enough to be overheard, "He had you that time, sure, Billy."

——:o:——

A Chat About Fog.

(*Continued from page* 86.)

By Duncan Moore.

SUNSHINE will penetrate a considerable thickness of wood; the position of an opaque body laid on it can be seen through two inches of deal in bright sunlight, provided the observer is in darkness, although the colour of the wood itself might act as a screen in a certain degree, and so make it practically innocuous as far as our plates are concerned. Still, light will penetrate many substances sufficiently to injure photographic plates that are supposed to be light-tight, if the exposure to it is sufficiently prolonged. *Verb sap.* Development as a source of fog is tolerably well understood, and usually proceeds from the use of an unsuitable developer, or the improper use of a suitable one. It is impossible to develop some plates with ammonia without producing the well-known green fog, a dichroic abomination that used to be much more prevalent formerly than at the present time, possibly on account of the more general use of the fixed alkalies in the developer instead of ammonia, as when soda or potash are used it rarely occurs. Deficiency of restraining substance may also engender fog, or a too great proportion of the developing agents, as pyro, metol, etc., to the alkalies and restrainer.

It has been suggested that white dishes that have been exposed to a strong light retain sufficient in a latent condition to fog a very sensitive film if used soon after removal from it; of course this would apply to any other white object recently removed from a strong illuminant, and brought into near proximity to very sensitive surfaces. Anyway, there is no doubt that very much greater precautions are required than formerly, if we are to steer clear of fog. Green fog by reflected and red by transmitted light, if only slight, has little effect on the printing qualities of the negative; some

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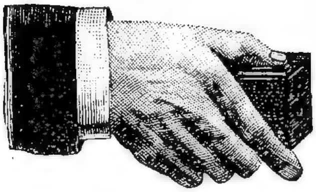

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photographers go so far as to call it an improvement, but a grey fog will ruin any negative, as it obstructs the light much more than its apparent density would suggest, and entirely obliterates that beautiful sparkle a good negative should possess, and at the same time renders it very much slower in printing, which is really the test of a good negative. Forced development is a fertile source of fog, when it is either adopted to obtain intensity, or get out detail. A properly exposed negative on a good plate should develop smoothly and steadily to a proper intensity in a moderate time without any forcing, and will usually be bright and clear. If a plate begins to show signs of fog as soon as the image is nearly out, it is best to stop development with the alkaline solution, and finish with pyrogallic acid and restrainer alone; this will prevent the further increase of fog, and make a much better negative than if continuing the use of the alkaline solution. Metol is a favourite developer with many as it has the power of bringing out poorly illuminated detail much more than pyro combination, but with one of the most popular makes of plates, the market invariably gives foggy images with the least forcing, and for just the kind of subject that would suggest its suitability it is altogether useless. When with another make it is everything that could be desired. This shows that the developer must be suited to the plate, if we are to expect high-class results. The universally satisfactory effects on almost all plates, obtained by the pyro-soda combination, has no doubt caused its general adoption, and there are few, if any, plate makers that do not give a formulæ for this form of developer for their special manufactures, varied a little in proportion of ingredients, but similar on the whole. A plate that fogs with it will fog with anything. Fog from over-exposure is probably an intermediate stage in the reversal of the image, the density of the high lights decreasing with a proportionate increase of reduction in the shadows, until the image consists of one nearly even change over the whole surface. When this occurs no developer would be likely to work satisfactorily, and we should see merely the development of fog as the action continued. On account of the reduction in the strength of the high lights the image would be very slow to appear, and give the impression of under-exposure, until a general foggy effect became manifest, and we realised the case was hopeless so far as a decent negative was concerned. In addition there sometimes occurs on plates a fog that seems to have the characteristics of light fog, when the greatest care has been exercised, and quite baffles any attempt at explanation. It is possible, since attention has been called to the Röntgen rays, that the plates may have been affected in some unsuspected manner by them through their protective coverings; however, this is a mere speculation, which may in course of time be confirmed or disproved as our knowledge increases.

——:o:——

Contact and Reduction.

(*Continued from page* 87.)

By T. Perkins.

When printing from these small negatives it will be necessary to protect the lantern plate from light, which would otherwise fall beyond the boundaries of the negative. The method I adopt is this—I cut a rectangle of cardboard as thick as the thinnest plate I am likely to use, 4¼ by 3¼ inches in size, and in it a central hole of 3¼ by 2⅜ inches, and also a rectangle of stout black paper 4¼ by 3¼ inches with a central aperture of 3$\frac{1}{16}$ by 2$\frac{3}{16}$ inches. This I paste on one side of the cardboard, which will then form as it were a bed in which the negative plate will lie, with a narrow overlapping strip to protect the edges from light. The printing frame should be furnished with a glass front, on which the cardboard is placed, in the central space of which the negative is deposited, and then the lantern plate laid on it, and finally the back-board placed on this and fastened in its place. It is well to purchase or to make a printing frame of the old-fashioned box form, as it is much safer than the form generally used for paper prints, but in order that the two plates may be kept square, the front glass of the frame should be only 4¼ by 3¼ inches in size. Then the card cannot slip about, and the top and bottom of the lantern plate will be kept parallel to the top and bottom of the negative, while the half inch at either end will allow the finger and thumb to be used in taking out the lantern plate after exposure.

It is sometimes spoken of as if one of the advantages of using a large negative for contact printing is that any part of it can be selected for the purpose, but from what has been said above, it is only safe to take the central portion, so that the point of sight of the view on the negative plate falls at equal distances from the right and left hand margins of the lantern plate; at any rate, in any picture in which the perspective is obvious. To print the top right hand corner from a whole plate of an architectural subject with the intention of getting a piece of detail which is shown in perspective is to court failure.

All of the difficulties and dangers that occur in contact printing which have been mentioned are avoided by making slides by reduction in the camera, in which case the whole of the picture shown on the negative is included in the lantern slide. If the composition would be improved, as in many cases it would be by cutting off something from the foreground or sky, or both, or equal amounts from each side of the picture, this can be easily done by choosing a suitable mask, or by reducing the aperture of any mask that includes too much by sticking pieces of black binding strips along the edges of the aperture.

I personally much prefer making slides by reduction from half or whole-plate negatives, as these negatives are of sufficient size for printing on paper, which $3\frac{1}{4}$ by $2\frac{5}{8}$ in. negatives hardly are. Still, to any—and there are many such—whose sole object is to make slides, I strongly recommend the plan described above, as I feel sure it will greatly add to the artistic value of their productions.

——:o:——

"The Dissolving Tap" and How to Connect up to it.

By a Lanternist.

Having been frequently asked to assist during the interval of a show with some dissolving effects, I have invariably found that the dissolver in conjunction with the jets has been to my idea connected up wrong, it works all right in a sense, but I think when my idea is explained my meaning will be clear. Having read in nearly every manual or makers' price list that the usual course to adopt is as shown in illustration Fig. 1, which many will no doubt say is quite correct; but is it so? The rule there is that when the dissolver lever is turned up, the bottom jet is up, and when the lever is turned down, the top jet is up; now to my mind this is wrong, for reasons that I will tell you. In working say some effects, one would get somewhat confused in turning the lever down or up as the case might be, to get the top or bottom lantern light up or down. Would it not make matters much more simple to connect up as shown in Fig. 2, where in working one turns the lever up, the top jet is up, or *vice versa.* It is so simple a matter that many may say it is somewhat twaddle, but I do think you will agree that when a tap is turned on, that is the handle or thumb-piece runs straight with the supply pipe, the gas should be on, but in the ordinary connecting up of a dissolver with the jets, it is not so; it is just on that principle that when the tap is turned crossways to the supply pipe it is on, and when turned straight with the supply it is off, which I consider is certainly contrary the proper rule.

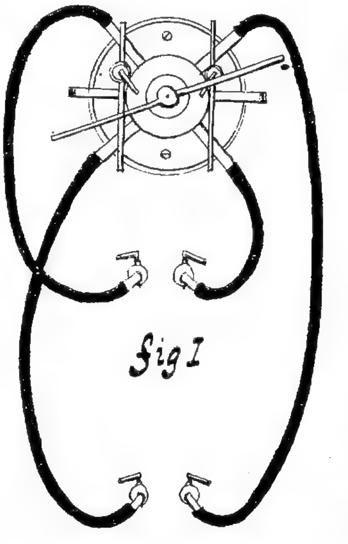

Fig I

In observing my sketches Figs. 1 and 2, you will see that the dissolver is placed at the top of lantern, that is, above the jets, and in Fig. 3 the dissolver is there shown as a number use it, between the two jets; but it is there shown connected up, so that the result comes the same as in Fig. 2. This is much more simple and certainly lessens the task of making heavy work, as some operators call it, especially when one is doing the whole work of operating and lecturing at the same time, which at the best

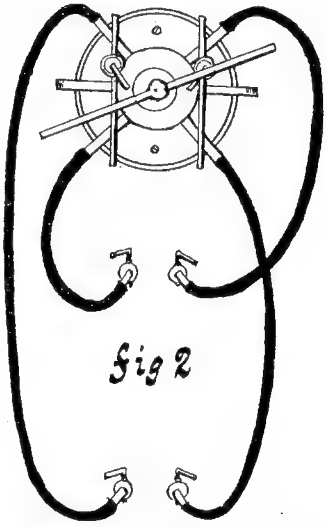

Fig 2

of times gives one plenty to do if done properly. What with changing the slides, some framed or not, turning the limes, dissolving and lecturing at the same time, I think it will be admitted that every idea, however small, is one more step to that perfectness which is now so necessary in lectures where so much depends on the effect of the pictures and the lantern operator.

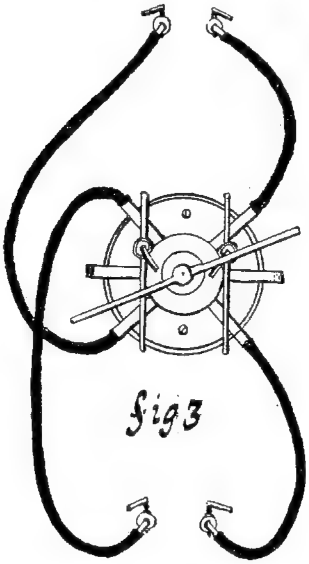
Fig 3

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Enlargements, and a Simple Apparatus for Producing Them.

By B. D.

Whilst the ¼-plate or hand camera worker often only thinks of his negatives as being useful for small prints or lantern slides, he is inclined to forget that some, at all events, are worth enlarging. Even if he sometimes recognises that an enlargement would be worth making, he hesitates to attempt such work, owing to a mistaken idea as to the difficulty and expense attending the production of an enlargement. Of course one can go to any amount of expense in providing a complete enlarging apparatus, but this is not necessary.

A short time since Messrs. R. A. and J. E. Hodd, at one of the principal London Photographic Societies, demonstrated their method of producing enlarged negatives, and although it does not in any essential particular differ from that of many other workers, a few notes from their paper will doubtless be of interest and use to any wishing to produce enlargements easily, and at small initial cost.

First, to select from our stock of negatives those that will prove most suitable for our purpose. Hardness, want of shadow detail and half-tone are fatal to success, and an excess of granularity, so often due to forced development, will be found equally objectionable. A negative with little or no clear glass, transparent and not over-dense in the shadows; in short, a soft negative full of detail will be the most suitable. If the negatives are taken with a view to ultimate enlargement, a good camera and good lens should be used, avoiding above all things under-exposure and over-development, and a granular film, which latter requirement points to the use of an ordinary plate, in preference to a very sensitive film.

Now for the apparatus required. It consists of a folding base-board, made box-form, in order to contain the entire apparatus when out of use. When unfolded and locked with an ordinary bush and tripod screw, it is perfectly rigid, and can be supported, if necessary, by means of an ordinary tripod at one end, and rest on a table or shelf at the other end.

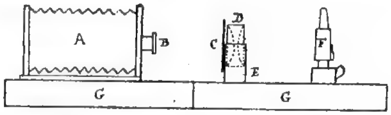
On the top of this box are four blocks, to ensure the lens and light being always in the same axis—a most important point.

The light found most suitable for the purpose was an original "Silber" paraffin burner, which, owing to its perfect combustion and brilliant, yet small, cone-shaped light, is eminently suitable for the transmission of the rays of light through the condenser. This lamp is run between two of the guides before-mentioned.

On the lamp is fitted a hood, consisting of a Russian iron plate with an oblong opening parallel with the cone of light, behind which is placed a crescent-shaped reflector; the effect of this being that all the rays of light are stopped, with the exception of those passing through the diaphragm opening to the lens, and in this way a certain increase of definition may be expected.

This system will be found very pleasant to work with, as the illumination of the focusing screen is not disturbed by extraneous light, and a focusing cloth is unnecessary; the eyes also being shielded from the glare of light, do not tire so readily.

The general arrangement is shown in the accompanying sketch.



A 6 inch condenser is mounted on a block keyed to the base-board, and in the same block is fitted, close to the condenser, a square carrier for ¼-plate negatives, which can be used either horizontally or vertically to suit the subject.

At the other end of the base-board is placed the camera, which may be a *Multum in parvo*, say 10 inch by 8 inch, fitted with a R.R. lens of 6¼ inch focus.

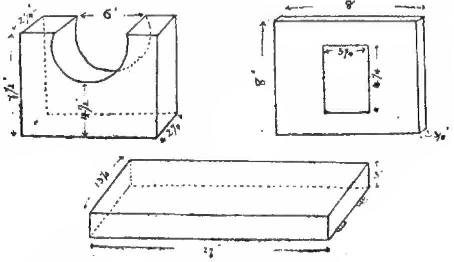
The base of this camera runs over the guide blocks previously mentioned, and is thus prevented from slewing out of the centre.

When enlarging on to paper, it will be advisable to place a piece of thin, clear plate glass in the dark slide first, then the bromide paper, and finally, a thin board or plate and a couple of steel springs will keep all up to register. Care must be taken in focussing to allow for the extra glass in front of the bromide paper. This is easily done by reversing the ground glass so that the rough side is innermost.

Exposure depends on so many factors, such as density and colour of the negative, size of enlargement, rapidity of bromide paper, aperture of lens, etc., that it is impossible to give definite rules on the point; a trial slip of the bromide paper to be used, placed in the dark slide, and exposed in, say, four sections, each section for double the time of the one before, will, on development, give a reliable guide for the necessary exposure.

For those who contemplate making such a piece of apparatus, I reproduce here Messrs. Hodd's particulars and measurements of the box case, condenser stand, and negative holder, the cost of making being simply the expense of the wood, hinges, and screws.

Make two wooden cases as follows :—



Inside measurements 26 inches by 12¼ inches by 2½ inches. To be made of good pine ½ inch thick when finished. To be hinged together flush, like a bagatelle board, forming a box with inside capacity exactly 26 inches by 5 inches by 12¼ inches, outside measurements 27 inches by 6 inches by 13¼ inches, and forming, when open, a platform measuring over all 54 inches by 13¼ inches by 3 inches.

Also make a wooden block as above :—

Finally, the negative carrier, preferably made of ⅜ inch mahogany.

This is, of course, for a quarter-plate negative. A rabbet $\frac{1}{16}$th of an inch should be provided all round the opening, and two brass flushed turnbuttons for holding the negative in place should be provided.

With this apparatus very good work can be done, either in producing enlargements on paper or glass transparencies, a process to which considerably more attention might be usefully and profitably directed.

——:o:——

Oxygen, Its Manufacture, Storage, and Use.—IV.

By Edmund H. Wilkie
(Of the Late Royal Polytechnic Institution).

My last chapter dealt with the Automatic Oxygen Generator invented and patented by Mr. F. J. Stedman, and which is made in two forms, giving a description of the first pattern produced, and I now propose explaining the second pattern, which although similar in principle differs in form and many of the details.

Both these pieces of apparatus possess advantages peculiar to themselves, and on that account it would be almost an impossibility to give a hard and fast opinion as to their respective merits, but as both forms may be seen in action the matter must be left to the individual taste of the user, and the choice must depend upon the circumstances under which the apparatus is to be used.

When closed the second pattern is a neat wooden case, the lid being at one end. We stand the case upright and remove the lid, taking out all the parts of the machine which are packed inside, when we find that the interior is really a zinc gasometer, the bell portion of which is turned upside down for convenience in packing, leaving the whole of the interior free for storing the other portions in. These are not of sufficient size to occupy the whole space, so the rest of it may be utilised by placing the screen on the top, thereby serving the double purpose of packing that essential but bulky article, and preventing the etceteras rattling. The first thing to do when setting up is to fix a shelf on to the side of the case upon which to stand the retorts and machinery for automatically moving the lamp; this is done in a moment, as the shelf simply hooks on to the top edge of the case by means of two flat iron hooks, and is

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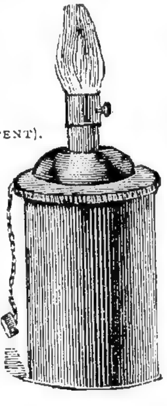

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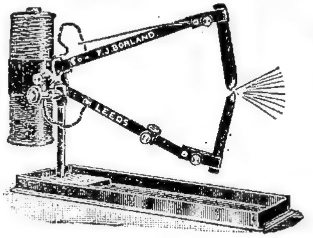

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strengthened by a wooden bracket below. The retorts and automatic machinery form a separate piece of apparatus by themselves.

Before proceeding to describe the oxygen generator as a whole, it will, perhaps, assist us to understand its working principles better if I go into the details of the mechanism of the travelling lamp.

The base of the stand, which supports the line of retorts, consists of a mahogany box containing the machinery for altering the position of the lamp. This important feature of the invention is illustrated at Fig. VII., where the side of the base has been removed in order that we may clearly see the working parts.

In the diagram (A) is a wooden block upon which the lamp is fixed, and which slides from end to end of the top surface of the box, being kept in position by a guide fastened to its under side and running in the groove (B); the power by which the lamp moves being obtained from the weight (F), which is attached to a line running up through the bottom of the box, and after passing round a pulley, continuing along the groove (B) until it reaches (A), to which it is fastened.

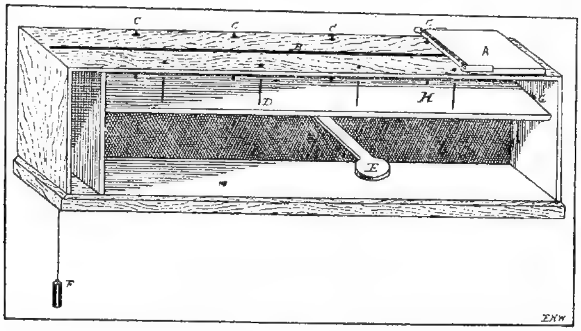


Fig. VII.

The weight being heavier than the lamp and block, (A) would at once rush to the opposite end if we did not restrain it in some way, and this control is obtained by means of a metal pin (C), against which the front of the block rests.

Inside the box is a long piece of mahogany somewhat resembling a loosely fitting shelf, pivoted each end on its centre, as seen at (G). This allows a rocking movement, and down each side of the top of this rocking shelf we find a row of metal pins (C) and (D), above which are holes so placed that the pins in rising and falling pass easily through them.

These pins are of such a length that if the shelf is kept perfectly level the tops of both rows are just below the surface of the top of the box, but if the side nearest the observer is depressed the line of pins (C) rises above the surfaces, and if it is then elevated (C) will disappear, and the pins (D) will rise in their turn.

Attached to the rocking shelf is the lever (E), by which it is moved when in action, and there is also a spring (not shown in the drawing), which presses the front edge of the rocking shelf upwards; this is its normal position.

At Fig. VIII. we have a side elevation of the whole apparatus in working order. Having stood the outer case (A) on end, and placed the bell of the gasometer (B) in its proper position, we fill (C) (which is a water-weight, and quite separate from the other portions, merely resting on the top) with water, and put it in position, the support (E), together with its chain and weight (H), is then slipped into its place, the retorts are fitted up as described last month, and we are ready to commence.

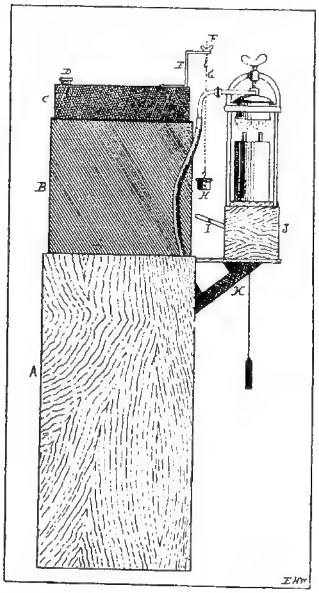


Fig. VIII.

After lighting the lamp, about three minutes elapsed before the gas began to generate, and then a faint bubbling sound could be heard as the gas passed through the water. It may be mentioned in this connection that the outer case contains two ordinary zinc pails of water, which, speaking from memory, gives about eighteen inches depth of water, and the gas passing through this unusual depth is thoroughly cooled and purified.

The bell of the gasometer at once commence-to rise, and by the time the charge in the first retort is exhausted, has risen sixteen inches.

A safety jet was connected, and a steady satisfactory light arranged. Then, of course, the top of the gasometer slowly sank down, the weight (H) sinking with it, until the majority of the oxygen being consumed, the weight rested upon the lever (I), and pressed it down, liberating the lamp, which, passed on to the next retort, heating the charge and generating another foot of gas.

The action is very smooth, and perfectly automatic; in fact, so far as that is concerned, the lantern could be placed in the attic, and the apparatus in the cellar, and everything would work the same as usual. The whole time occupied in getting the generator to supply gas in sufficient quantity to commence working from the time of lighting the lamp is about four minutes. The convenience attending the use of such an apparatus is very great, and its importance, especially to those living away from the great towns, can scarcely be over-estimated.

While upon the subject of portable gas making apparatus, it will perhaps be convenient to mention a very useful little appliance arranged by B. J. Malden, Esq., of the late Royal Polytechnic Institution, whose ingenious retort was illustrated in the first part of this paper. (See this Journal for March, 1896, page 41.) It is not for home use, but is intended to meet the wants of the travelling lecturer who takes his whole kit of oxygen making apparatus about with him on lengthy professional tours.

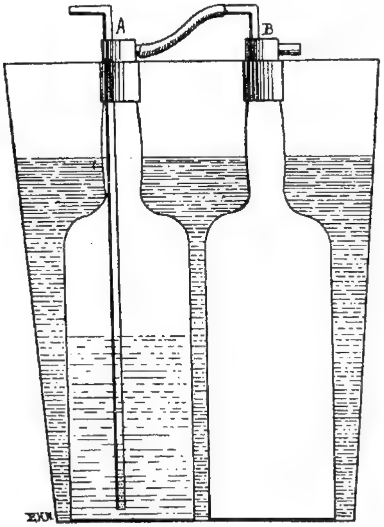


Fig. IX.

It is important in this case that no space should be lost, and that the weight should be as small as possible.

As will be gathered from the diagram (Fig. VII.), the apparatus is for purifying the gas, and the main body of it is composed of materials which can be obtained almost anywhere within the bounds of civilisation.

The first portion of the apparatus (A) consists of a metal cap, through the closed end of which is passed a metal tube of sufficient length to nearly reach the bottom of a wine bottle when the cap is fitted to its neck. At the side of the cap is soldered a short outlet tube.

The second portion (B) is a similar cap with two tubes soldered into it, but neither of which descend into the body of the bottle, as the object of this second bottle is simply to catch any splashings which might be driven along by a rush of gas. The caps are fitted on in the same manner as the retort edge by a few inches of flexible tubing, and the first bottle being half filled with lime water, the two are connected and placed in a zinc pail containing water, the object of which is to keep the bottles cool. Mr. Malden, subsequently exhibited this arrangement to a manufacturer of lantern apparatus, and I believe these bottle heads are now to be obtained commercially.

Next month I hope to treat on an entirely different process of making oxygen gas.

—:o:—

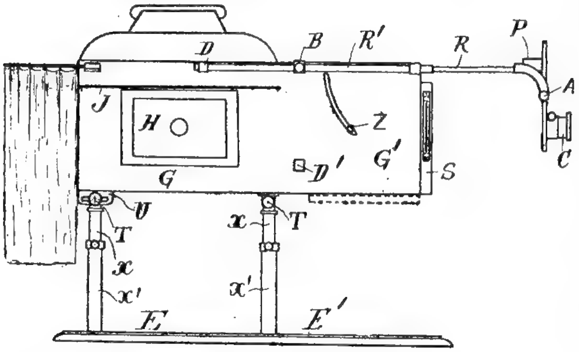
A Lantern For Science Teachers.

By E. Drew.

Every endeavour is made at the present time to render the lantern more expedient, and the following few notes and sketch may be helpful for anyone wishing to construct a lantern for scientific purposes. The most important feature to be aimed at is ease of manipulation, and not lightness. The former is often sacrificed in order to ensure the latter; but the lightness of the lantern is not so necessary when it is not required to be removed from the institution or college where the demonstrations are to be carried on.

The general arrangement of the lantern is shown in the sketch, and though some of the individual portions may be familiar, the combination is new. The body of the lantern is mounted upon four upright pillars, similar to that of the Duborc form of lantern, upon a base E, E^1. The front portion E^1, should by preference be made to extend. The portion G^1

of the main body G, contains the optical parts of the condenser, being arranged upon the principle of Messrs. Stroud & Rendell's science lantern described in The Optical Magic Lantern Journal, No. 81, page 32, 1896. It possesses a great advantage over the usual methods, as by the addition of one more condenser, objects to be shown in a horizontal position need not be shifted in order to allow ordinary slides or apparatus to be shown in the usual manner. The four pillars upon which the main body of the lantern rests, are telescopically slid one over the other so as to allow the lantern to be tilted either upward or downward, independent of the base E. The slotted bracketed piece U, allows for any elongation that takes place in the tilting. The inspection door slides sideways upon rods J, and will be found in many ways very convenient for working. The objective and pencil attachment P, are fixed upon one board and mounted at the centre so as to be capable of revolving. This allows either to be brought rapidly into use when required.



The adjustment of the lens is brought about by sliding the tube R, within R^1, and when using the lantern for projections, the rods R R^1 are swivelled at B, and brought into a vertical position, and are retained in this position by stops D^1. The slide carrier S is hinged at its lower end, so as to allow it to be swung round underneath the body of the lantern. In this way objects to be shown, such as a vertical tank, can be brought up quite close to the condenser, enabling full advantage of the aperture in the lens to be taken. The open space will be found a very great advantage. Under the overhanging portion of the body of the lantern G^1, the hands will not be found to be cramped for movement so much as they would be if there were a straight wall from the condenser downwards. As in many cases, the ordinary round base stands are used to support objects in front of the stage.

A dinner waggon forms a very useful stand for a science lantern of this description. The lantern is placed on the top, and the lower shelves may be used for the apparatus and the slides to be exhibited. The castors allow the waggon to be moved and placed at any angle required to the screen upon the floor of the lecture hall.

The cost of a dinner waggon would be very moderate if a little trouble is taken. One suitable for the purpose might be picked up at a sale or second-hand shop. The chief essential of the waggon is that it should be firm, then little else matters.

——:o:——

Topical Notes.

By The Dreamer.

The pleasant midsummer-like weather at the time I write—it may be more or less arctic by the time these lines appear in print—is not conducive to lantern work, although many of the societies have to eke out the season with lantern evenings.

I notice that at a recent meeting of one of the London societies, instead of employing an oil-lamp, or compressed gas in cylinders, Mr. Stedman's automatic oxygen generator was employed, Mr. Stedman himself acting as lanternist. From all accounts the light gave excellent results, and the working of the apparatus justified its name of "automatic."

The great boom at the present time is the cycle boom, but lanternists are not to be without their little boom, which appears to be the acetylene gas boom. There is an immense amount of experimenting and investigation being carried out, and by the time the next lantern season proper comes round again I shall be much surprised if acetylene generators are not to the fore, although of course they will never displace limelight.

When the limelight jet is displaced it will, in my opinion, be by the electric light.

There is a really long-felt want which will some day be supplied, and that is a light secondary battery or accumulator for storing electric energy. In fact, what we want, and many others outside the lantern world as well, is what I may term compressed electricity as an addition to or substitution for compressed gas.

THAT some such accumulator will one day be discovered is certain. We shall then be able to send our battery to the nearest electrical station to be charged in the morning, and obtain a sufficient supply of electricity for our evening's work or lecture.

THE lantern is not only a source of amusement, pleasure, and instruction, but is often employed in the cause of charity and goodwill. A few years ago a few enthusiastic lanternists resolved to see what they could do to cheer up the lives of the inmates of the London hospitals and workhouses, and for some two or three years their good work was carried on and much appreciated by their audiences.

BUT the cost of carrying on the work and the lack of assistance from those who could well assist in the work, led to the gradual discontinuance of the entertainments. Is the society to be revived?

ANOTHER instance of the use of the lantern in the good cause of charity came under my notice a few weeks ago, when a lantern lecture was given in one of the London suburbs to aid the funds of the local hospital. The admission prices were not cheap, but a very good audience was brought together. Of course, radiography or shadowgraphy figured largely in the bill.

No doubt our manufacturers are racking their brains for novelties for the next season. Cannot some of our opticians turn their attention to the question of a compact set of lenses of varying foci for the optical lantern? The present system, besides being expensive, also greatly increases the weight of the lantern apparatus when, say, three different sets of lenses are carried.

WHAT is required is a sort of casket of lenses—say a front combination with three interchangeable back combinations—so as to give foci of say 5, 8, and 12 inches; or possibly a single lens combination might be devised with adjustable negative lenses, somewhat after the method introduced by the late J. Traill Taylor many years ago. Such a combination would considerably lighten the outfit, and lessen the cost of the optical portion of the lantern.

The Oxyhydrogen Incandescent Gas Light.

BY WILLIAM PENMAN, C.E.

WE have received the following lecture, with illustrations, from Mr. Penman, which he lately gave before the Edinburgh Photographic Society:—

I have much pleasure in communicating the result of a few experiments I have made in order to adapt the use of the Welsbach lamp for optical lamp enlargement work in place of the oil pattern, and I hope to demonstrate some decided advantages possessed by this lamp.

I do not wish to claim for this light when burning ordinary house gas, or even when aided by other means explained in this paper, that for *intensity* it can approach the limelight, but it is rather in the direction of showing slides to a small audience, and making photo enlargements, that I have hitherto worked.

To my mind there are three pretty sharply-defined classes of photographers in these days. Firstly, the "button-presser"; secondly, the "half-plate carrier"; and, thirdly, the "studio man." Claiming myself to be one of the second class, I have to confess that this communication, while intended to interest all, will, I hope, commend itself to this great and growing class, amateur as well as semi-professional. Let me define it more sharply. It contains those who, having produced a good negative and a good print, have sufficient knowledge of their photograph to cause them either to attempt a lantern transparency or make a bromide enlargement of the picture. But, unfortunately, it also contains those who can produce the perfect negative with its charming print, who have to stop short for want of an easily worked and comfortable projection light.

You ask me what I mean by an easy and comfortable light? At this stage you will pardon me replying in the negative form—(1) A light requiring no preliminary trouble before lighting; (2) no trouble or adjusting after lighting; (3) no smoke or smell; (4) a minimum of heat; and (5) a sufficient intensity with great actinism and pleasing colour.

Now, in these specifications you will doubtless think I strike for a very high standard, but when we remember some of the great objections which pertain to the oil lamp on the one hand, and the limelight on the other, I venture to say that the elaborate drying, trimming of wicks, and cleaning with oily rags which precede the use of an optical oil lantern, not to mention the smoke, smell, and great heat, are sufficient to make one hesitate before starting an enlargement in the dark room, or venturing into a drawing-room full of ladies. In both cases the final "blow-out" is a relief to all concerned.

Turning now to the use of the limelight, with its great brilliancy and immense power, there can be no doubt that to the vast majority of those I now particularly address it would prove a needless waste of energy. In the first place, for dark room work its heat is intense, it requires almost constant attention while at work, and the flame is after all not so steady as one would wish. Taken into the drawing-room, the hissing is objectionable to the audience, while the small innocent explosions which sometimes occur within the lamp are very unpleasant if it is doubted that the lamp is in careful hands.

Possessed as I have been for the last six or seven years of one of these "paraffin oil optical furnaces," which I generally used in a very harmless way for micro projections, and throwing a six or seven feet disc comic slide on the screen now and again to amuse my children, I kept an open mind, as Mr. Gladstone used to put it, for any reasonable improvement short of increase in "furnace" power. Over a year ago I began to turn my attention to the Welsbach incandescent gas light, which was making electric light promoters feel rather uncomfortable in many quarters, and about the same time a writer in one of our journals "wondered whether this light would give a better colour than that of oil in the magic lantern." Having procured from the Incandescent Gas Light Company one of their burners, I had it fitted to a stand to go into my lantern, and made so that the centre of the illuminant would coincide with the axis of my condensers.

As some may not have studied the construction of the Incandescent Company's lamp, I would like to describe it generally. It consists of a Bunsen burner with its tube widened out at the top, into which is fitted a wire grating with a circular stop in the centre, which does the double duty of dispersing the flame equally round the burner and serving as a stand for supporting the porcelain stick, to the top of which the mantle is suspended. As the mantle forms the subject of patent, and not being a chemist, I can tell you little about its components, but I believe it to be constructed of material resembling the cotton from which ordinary wicks are made, and which is dipped into a liquid consisting mainly of thorium after being woven. From what I saw at a kiosk at the Amsterdam Exhibition last summer, where a large working exhibit in mantle-making was going on, I can quite understand that the manufacture of these articles must be a very remunerative business, and possibly well deserving of the most jealous protection against competition. Although personally I have not the slightest interest in the Incandescent Gas Company's concern, I think it may interest the meeting to quote from the printed report by the manager of the Leith gas works, which states that for the cost of 1,000 feet of gas, viz., 3s. 6d., the incandescent electric gives 1,540 c.-p.; common gas in a five-feet per hour jet, 5,000 c.-p.; and gas in the incandescent Welsbach burner, 18,440.

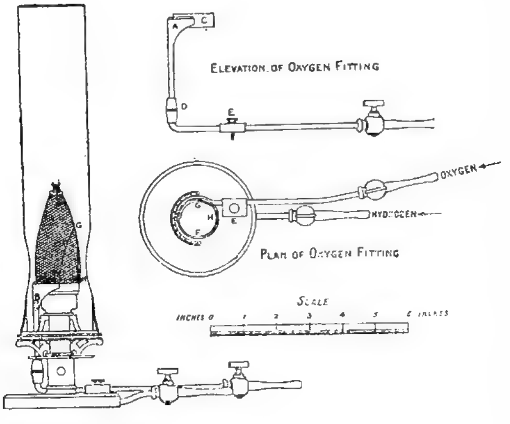
Returning to the subject-matter of my paper, viz., the adaptation of the Welsbach light for ordinary lantern work, I find in it all the superior convenience which gas always possesses over oil lighting—minimum of trouble, absence of smell, and almost complete safety. A few yards of rubber tube attachable to any convenient jet is the only requisite. The tap gives the power of instant regulation, and the lamp in the lantern may be left burning by purpose or accident any length of time without attention or danger greater than that of neglecting to turn out the "lobby gas before retiring." In connection I may here confide that although I seldom "hardly ever" forget to turn out a jet before locking up, I did so on one occasion with this lamp. I was admiring a new slide which I had that day purchased, when I was called from my dark room, and forgot to return. Next evening, on entering the room, my classic statuary figure burst forth in full view, to my atonishment, and knowing the joke only cost me about a penny, I think I can afford to tell you it in confidence, at my own expense!

Considering this light from an optical point of view, I find its colour compared with an oil lamp a great improvement, resembling as it does that of the lime and electric arc lights. A purity and crispness is at once discernible, and, what is much more valuable to us, its actinic power is very much greater than that of oil, and as we well know shortening of exposure in enlarging means prevention of fog, this attribute alone should be sufficient to commend it to your consideration.

The lantern is provided with a circular hooded chimney to take the ordinary funnel of the lamp, and although I have found no serious tendency to breakage, I have adopted the mica chimney in preference to glass. This chimney costs only 1s. 4d., and with care will last many years. The confinement of this lamp in a lantern has absolutely no deteriorating effect upon its burning, even when a focusing cloth is thrown over to prevent stray rays reaching the bromide paper when enlarging; and in connection with this I may say that so far from this light approaching what I have called a furnace, I find it possible to use the focusing cloth in this way during a pretty long exposure without singeing the cloth, and there is certainly no need of the alum tank.

Throw a picture of 7 feet disc upon the screen, and you will note the purity of colour and steadiness of light. Note also a property which may be useful in the dark room, viz., that the light may be turned completely out for two or three seconds, and burn up again when turned on.

In order to shorten exposures, and at the same time be enabled to give a lantern demonstration to a moderately sized audience such as this, I commenced to experiment by feeding oxygen into the lamp in the hope that an improvement would result. But I soon found that by mixing the gases in a Bunsen where air is present forms an explosive mixture, and is an experiment not likely to be repeated by any one who tries. I then determined to burn the oxygen outside of the lamp proper, and designed a burner for the purpose, which has been found to work well and safely. If you will kindly refer to the drawings, I will endeavour to explain its simple construction. The drawing is a semi-sectional elevation of the lamp, and the red lines show the general construction of the oxygen attachment. The oxygen comes from the cylinder, per regulator, in the usual way. After passing the check stopcock, it passes through perforations in the end of a tube, which spread the gas within the burner, and finally the gas emerges through very fine perforations on the top of the burner at a low pressure, and acts by stimulation of the incandescence on the part of the mantle next the condensers. The burner and a portion of the supply pipe is fitted to the top of the lamp by an annular ring, and may be removed by unscrewing the union joint should the remaining part of the fitting require to continue fixed. The whole apparatus, however, may be removed by unscrewing the pinching screw which secures it to the foot of the lamp, so that by means of these arrangements the oxygen part can be added or be dispensed with as occasion requires. When in position, the top of the oxygen and hydrogen burners should be about the same level, with a space of from $\frac{1}{16}$ in. to $\frac{1}{8}$ in. between them, into which the foot of the mantle slips.


A
C
Elevation of Oxygen Fitting
D
E
Oxygen
G
H
E
F
Hydrogen
Plan of Oxygen Fitting
Scale
Inches 0 1 2 3 4 5 6 Inches
G
Elevation of Lamp & Fitting

During my first experiments with oxygen in this way, I was troubled by finding that the most brilliant part of the mantle sometimes faced the back or a side of the lantern, away from the condenser, with the consequent darkened field upon the screen. To meet this erratic habit, I thought of fitting a turn-table on the Welsbach fitting. After repeated experiments, however, I found the best way to cure this is to block out the rear portion of the mantle by means of a hood of platinum foil placed inside the mantle, and held in position by the ring which supports the oxygen burner. This is a "perfect cure," as it not only concentrates the light to the front, but enhances its illuminating value, and also helps to steady the mantle without doing it injury. I may here say that this is a most essential part of the apparatus, and one which I claim as quite novel. When we come to consider the photometric values later on, you will be better able to appreciate what I have just described.

It is needless to deny that the fragile nature of these mantles is very much discounted by the public generally, and especially those who have not tried or given them fair play. For instance, the mantle sold by the Company is, as a rule, too long, or, as the ladies say, too "deep in the skirt"; but in order to adapt it for this lamp, I usually clip fully half an inch off the bottom, which has the effect of preventing splitting and fraying, so common in ordinary lamps.

One of the chief fears I had for the success of the oxygen fitting was the interference with the air passage between funnel and mantle, but I find no deterioration whatever. In fact, in the course of my experiments, I have disturbed and

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upset all the air currents at one time or another, and have not been able to detect any reduction of intensity, or even unsteadiness of light. An oil lamp, if treated as I sometimes treat the one before you, would nearly suffocate the operator with smoke, or go out altogether.

Before leaving the subject of the mantle, allow me to state that up to the present I have found that no injury whatever is done to the mantle by burning oxygen as I describe, neither can I detect any lessening of its durability. Under ordinary care in moving the lamp about, even from one room to another, there is no reason why a mantle should not last an operator a whole season; indeed, I have had one in frequent use during three months, which is as good as when first lit.

In order intelligently to express in figures the actual value of this light, I asked Mr. Ivison Macadam to make some careful photometric tests, which he was good enough to carry out at the expense of considerable time and trouble, extending over several evenings, at my own house, and also in his own laboratory; and on considering these figures, you will be good enough to bear in mind that they are comparative tests, inasmuch as where gases were used the hydrogen consumption was in all cases kept the same, namely, to the low quantity of 3 cubic feet per hour.

(*To be continued*).

—:o:—

New Apparatus.

"BESSUS" GAS CYLINDER CASE AND STAND.

Ever on the alert to bring out something useful, Messrs. Airs & Co. have just introduced a cylinder travelling case and stand combined. Fig. I. represents the case closed, and Fig. II. opened ready for use. To open it, it is simply unlocked, the cap removed, the sides allowed to fall down as shown, when they at once form a series of firm struts for the cylinder, thus preventing it from falling, even should anything happen to collide with it. Within the cap and lower end of the case pads are placed which encircle the cylinder, so that under no circumstances can concussion to the case be communicated to the cylinder with any force.

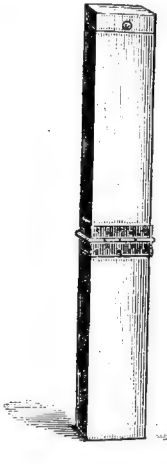


Fig. I.

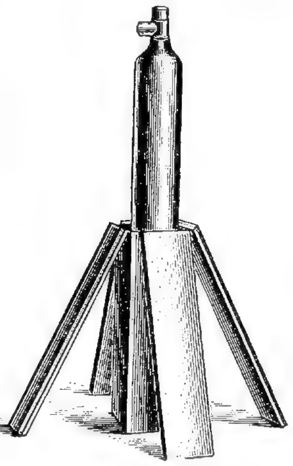
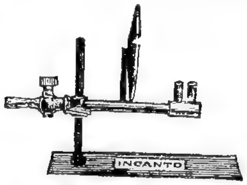


Fig. II.

ACETYLENE BURNER.

The following is a cut of the burner used with



the acetylene gas generator described in last issue, and made by Messrs. Thorn & Co.

X RAYS APPARATUS.

Messrs. Newton & Co., of Fleet Street, are now supplying great numbers of complete apparatus for this interesting branch of photography. The set consists of battery, coil, and focus tube, which, with about three minutes' exposure, will take a distinct photograph of the bones. Fluorescent screens are also supplied by this firm, but are separate and distinct from the "set." With these screens, the bones of the hand can be distinctly seen if placed in the X rays. With these screens, the following instructions are issued:—

"The room must be quite dark; a coil giving at least a 6-inch spark, and one of our 'Special' Focus Tubes must be used to obtain the best effects. The tube should be so fixed in a clamp that the rays from the flat platinum reflector are directed to the face of the observer. A large black paper screen should be placed close to the tube to stop any visible rays from reaching the eye. As close as may be convenient to this screen place the hand, or other object under inspection, and in close contact with this place the fluorescent screen with the fluorescent material turned towards the observer. The rays leaving the tube thus traverse first the opaque paper screen, next the hand or other object, and then come through the opaque back of the fluorescent screen, and affect the fluorescent material. It is sometimes necessary to warm the special Focus tube to obtain the best results.

"Remove the glass front, and slightly damp the fluorescent surface before use.

"With this arrangement, metal or glass objects can be readily seen when packed inside an ordinary leather bag, even if also enclosed in wooden or leather cases and wrapped up in thick papers. A coin can be seen through a block of wood, such as is used for paving the streets; the bones in the arm are clearly discernible through the flesh and clothing, and the motions of the bones in the wrist, hand, and arm can he studied with ease."

——:o:——

Patent Intelligence.

The following list, relating to current Patent Applications, is compiled expressly for "The Optical Magic Lantern Journal" by a registered Patent Agent. For further information apply to The Patent Department, "Optical Magic Lantern Journal," 9, Carthusian Street, London, E.C.

No.	Recent Patent Applications.
8418.	21st April, 1896. J. Bonn. Improvements in connection with the projection of photographs of animated subjects.
8663.	24th April, 1896. W. White. Improvements in apparatus for producing and viewing colour photographs.
9890.	9th May, 1896. W. Hunt and J. Trotter. Improvements in kinographic and kinoscopic apparatus, and in obtaining naturally coloured effects therewith.

Recently-printed Specifications.

Copies of the following specifications may be obtained by remitting 1/- for each specification to The Patent Department, "Optical Magic Lantern Journal," 9, Carthusian Street, London, E.C.

7656 of 1895.	Allen. Optical lanterns.
7749 of 1895.	Baird. Adjustable stereoscope.
11039 of 1895.	Humes. Gas compressors.
9881 of 1895.	Justice (Hough). Obtaining from pictures the appearance of movement.
11892 of 1895.	Hepworth. Arc lamp for projection, etc., purposes.
11966 of 1895.	Willway. Ether saturator.

——:o:——

Editorial Table.

The Year Book of Photography (London: *The Photographic News*), 1s.—This annual, which has now been running for thirty-seven years, has come out this year in an entirely new style of dress, and has assumed a brighter aspect than it has done in the past. It contains some excellent articles, and a host of general hints consisting of facts and formulæ, which have been compiled by Mr. E. J. Wall, F.R.P.S.

——:o:——

Correspondence.

OIL LAMPS.

To the Editor.

Sir,—In answer to your correspondent, Mr. W. Stocks, the article in question was not written hastily; on the contrary, I think it is he who has read it hastily, or he would have noticed that the remarks as to tilting a lamp swinging on gudgeons did not refer to lamps of the edge-wick class at all. I am quite aware that a partially-filled tank can be tilted a certain extent without spilling oil, and an empty one inverted with the same result, but I think the usual practice of lamp users is to fill a tank to the top or nearly so. The answer to Mr. Stocks' final question is that no ordinary lamp can be placed sufficiently close to a long focus condenser in any ordinary lantern without alteration either to the lamp, lantern, or both. In conclusion, I must enter a protest against a tendency, which appears to be growing in certain quarters, to treat as personal attacks, communications from those like myself who wish to see improvements in various classes of lantern apparatus. Of course, if the lamps we have at present cannot be improved upon, so much the worse for the makers, as they will eventually be superseded by newer and simpler illuminants such as acetylene.

Yours truly,

THE WRITER OF THE ARTICLE.

——:o:——

Notes and Queries.

Röntgen Rays.—By giving a short exposure the flesh of the finger will, as well as the bone, be visible, but by a prolonged exposure the flesh becomes less distinct.

S. C. R. asks:—If it is possible to burn acetylene in a Bunsen's burner, and thus use it for heating purposes instead of for lighting? *Ans.*—In the course of experiments we tried this, but failed to get it to light at the top of the tube admitting the air, the gas in every instance fired back to its outlet, and burned there, and no amount of careful turning up or down, or careful lighting would give us any other results.

Ernest Eade.—We fail to see where the patent comes in.

Arthur Hartley asks:—Can you give the readers full particulars with drawings in next journal as to how to make a camera for obtaining say a dozen exposures a second, a method of developing the pictures and making transparencies from same, and also how to construct a lantern to show those effects on the screen after the style of what is called "living photographs?" *Reply.*—We regret we are at present unable to "fill the order," but in a short time may possibly be able to do so.

S. L. Wilton.—(1) You will find it advantageous to use a mixed jet. (2) Use automatic regulators on the cylinders, and turn the valve full on; then adjust the light by means of the taps at the jet, not the bye-pass as you suggest. (3) If you use the "Injector" or "Ejector" jets you can use hydrogen from the house main. (4) The bye-pass allows a small quantity of gas to reach the jet, sufficient to maintain a small flame when the dissolver cuts off the supply.

Albert Tranter.—In our next.

B. R.—Give a longer exposure (*re* X rays), and it will have a tendency to make the flesh portion of the finger less apparent.

W. H. Mathieson.—The back numbers have been sent. Acetylene will not rival the limelight, but for your purpose, as you use the oil light, will be a step in the right direction. We cannot say whether calcium carbide is at present procurable in New Zealand. In England the price of same is gradually coming down, and you will observe an advertisement in this issue quoting it at 6d. per pound.

A. H. Saunders.—We quite forgot to call on you during our visit to Birmingham a few weeks ago.

Several replies have been held over for want of space.

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109 IS THE **MOST POWERFUL** LAMP EXTANT.

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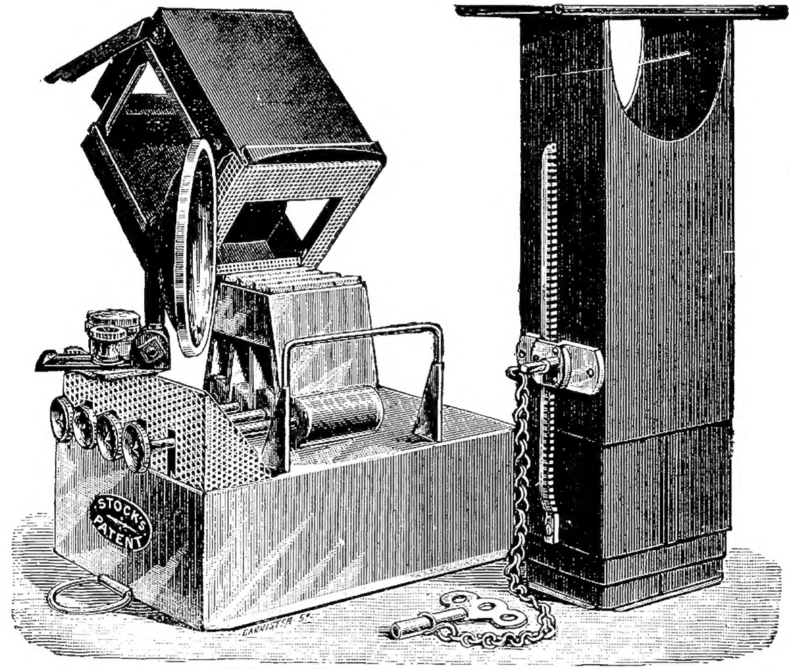

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"*October 10th*, 1894. (Signed) W. J. COLES, A.M.I.C.E."

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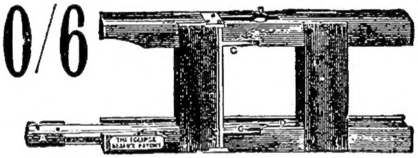

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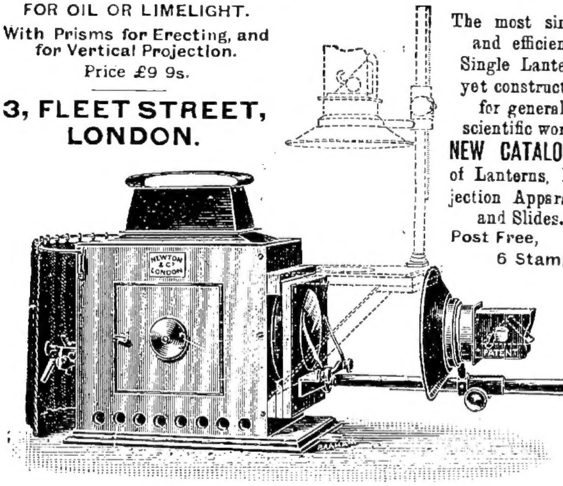

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43. Man's elbow joint.
44. Hand of Mummy, 3,000 years old.
45. Young Pigeon, 10 days old.
46. Dove, showing bones and feathers.
47. Lead pencil and horn magnifier.
48. Written letter taken through envelope.
49. Mouse.
50. Three live Frogs.
51. Man's Hand, showing pieces of iron.
52. Tortoise. &c., &c., &c.

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LIST OF APPARATUS AND SLIDES ON APPLICATION

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